

#### D. Remarks

The claims are 1-26, with claims 1, 6 and 15 being independent. Claims 3, 4, 11-13 and 15-26 have been withdrawn from consideration. Claims 6-13 and 15-26 have been amended solely to correct punctuation. No new matter has been added.

Reconsideration of the claims is expressly requested.

The Examiner will note that upon allowance of the presently pending claims (particularly claims 1 and 6), all withdrawn claims are entitled to be examined in this application due to being:

(i) drawn to additional species which are written in dependent form or otherwise include all of the limitations of the elected generic claims;

(ii) linked by claim 1; and/or

(iii) directed to process of producing the product of claim 1 and the claims linked thereby, under M.P.E.P. § 821.04.

Applicants have timely traversed all restriction/election requirements in this application and timely requested rejoinder and consideration of all claims in response thereto. Accordingly, rejoinder of all claims is again respectfully requested.

Applicants have submitted herewith a substitute specification in order to correct grammatical, typographical and syntax errors and to better conform the subject application with proper idiomatic English. A marked-up copy of the original specification, showing the changes made thereto, has also been provided. No new matter has been added. Entry of the substitute specification is respectfully requested.

Claims 1, 2, 5-8 and 14 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over JP 6-208076 (Sakamoto). The grounds of rejection are respectfully traversed.

Prior to addressing the merits of rejection, Applicants would like to briefly review some of the key features and advantages of the presently claimed invention. The present invention, in part, is directed to a metallic mirror comprising aluminum or an aluminum alloy substrate with an intermediate  $\text{TiO}_2$  layer and a metallic reflective Cu layer formed on the intermediate layer. The presence of the  $\text{TiO}_2$  intermediate layer overcomes problems encountered by the prior art, such as corrosion and film lifting.

The Examiner rejected the present claims over Sakamoto. This reference discloses a mirror that has a Cr intermediate layer. The Examiner has alleged that since  $\text{TiO}_2$  is a well-known high index material in the same field of endeavor for the purpose of increasing the optical reflectance of a metallic mirror, it would have been obvious to substitute a  $\text{TiO}_2$  layer for the Cr layer in Sakamoto. Applicants respectfully disagree.

Sakamoto is discussed in the originally filed specification at page 2, lines 6-16, and page 3, line 3 - page 5, line 2. Due to the use of the Cr intermediate layer, the polygonal mirror disclosed in Sakamoto has stability problems associated with corrosion and film lifting (see page 3, line 10 - page 5, line 2; Figs. 6-12). The present invention, however, solves these problems by substituting a  $\text{TiO}_2$  layer for a Cr layer used in Sakamoto.

Specifically, using a  $\text{TiO}_2$  intermediate layer instead of a Cr intermediate layer results in unexpected, superior results that are clearly demonstrated by the Examples in the present application. In the Examples, Applicants compared the mirrors such as those

made according to the teaching in Sakamoto to the mirrors made in accordance with the presently claimed invention (page 23, line 7 - page 26, line 4). The surface of each of the TiO<sub>2</sub> thin films and the Cr thin films was observed on an FESEM (field emission scanning electron microscope). The surface of the Cr thin film, as shown in Fig. 13, has a columnar texture and allows H<sub>2</sub>O and O<sub>2</sub> to pass therethrough (page 25, line 22 - page 26, line 4). When water penetrates into the film, with oxygen dissolved therein, it passes from the outermost layer through to reach the underlying aluminum substrate. As the result, an aluminum oxide is formed, such as Al<sub>2</sub>O<sub>3</sub>, which causes volume expansion and results in defects (page 3, lines 15-21). However, as shown in Fig. 14, the TiO<sub>2</sub> thin film has a dense film structure and is presumed to be able to prevent the penetration of water and oxygen. Clearly, using the TiO<sub>2</sub> layer in the presently claimed invention produces unexpectedly superior results.

The Examiner has alleged that since the TiO<sub>2</sub> layer, as well as the Cr layer, is a high index material, it is obvious to substitute the Cr layer with the TiO<sub>2</sub> layer. The Examiner will note that Cr is a metal, which is opaque, whereas TiO<sub>2</sub> is a metal oxide, which transparent. Hence, in general, these materials are not interchangeable. Furthermore, since Cr is a metal and an opaque material, it has a large absorptivity. Thus, the refractive index of TiO<sub>2</sub> cannot be compared with that of Cr in the same manner, which is a further indication that these materials are not interchangeable in the context of the presently claimed invention.

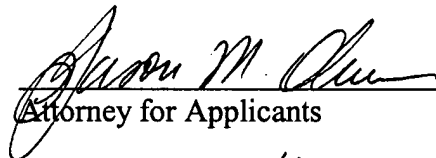
For the reason that it is allegedly obvious to substitute the Cr layer with the TiO<sub>2</sub> layer, the Examiner stated that TiO<sub>2</sub> is a material that is commonly used in order to increase the reflectance and durability of the metallic reflective mirror. However, the TiO<sub>2</sub>

layer is usually used in layered materials in which it is laminated to another transparent layer having a low refractive index, not to a metal layer such as a Cu layer. In addition, the TiO<sub>2</sub> layer is normally used to bring about the reflection preventing effect or light reflection effect by light interference between the TiO<sub>2</sub> layer and another transparent layer having a low refractive index. On the other hand, as described in the specification at page 10, lines 14-19, the use of the TiO<sub>2</sub> layer in the present invention is to inhibit corrosion and to increase adhesion, where the TiO<sub>2</sub> layer acts in quite a different way from the above normal use of the TiO<sub>2</sub> layer. Therefore, it would clearly not be obvious to substitute the TiO<sub>2</sub> layer for the Cr layer in the present invention.

Accordingly, it is clear that the presently claimed invention is patentable over Sakamoto. Wherefore, Applicants respectfully request that the outstanding rejection be withdrawn and that the present case be passed to issue.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address given below.

Respectfully submitted,

  
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